Empowering Things With Intelligence: A Survey of the Progress, Challenges, and Opportunities in Artificial Intelligence of Things

Year: 2020 | Citations: 545 | Authors: Jing Zhang, D. Tao

Abstract

In the Internet-of-Things (IoT) era, billions of sensors and devices collect and process data from the environment, transmit them to cloud centers, and receive feedback via the Internet for connectivity and perception. However, transmitting massive amounts of heterogeneous data, perceiving complex environments from these data, and then making smart decisions in a timely manner are difficult. Artificial intelligence (AI), especially deep learning, is now a proven success in various areas, including computer vision, speech recognition, and natural language processing. AI introduced into the IoT heralds the era of AI of things (AIoT). This article presents a comprehensive survey on AIoT to show how AI can empower the IoT to make it faster, smarter, greener, and safer. Specifically, we briefly present the AIoT architecture in the context of cloud computing, fog computing, and edge computing. Then, we present progress in AI research for IoT from four perspectives: 1) perceiving; 2) learning; 3) reasoning; and 4) behaving. Next, we summarize some promising applications of AIoT that are likely to profoundly reshape our world. Finally, we highlight the challenges facing AIoT and some potential research opportunities.